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REPORT 1

A DESCRIPTIVE ANALYSIS OF THE BAKERY PRODUCTS INDUSTRY DETAILING INDUSTRY TRENDS AND CHARACTERISTICS RELEVANT TO ECONOMIC IMPACT ANALYSIS OF ENVIRONMENTAL STANDARDS

FOR THE

COUNCIL ON ENVIRONMENTAL QUALITY

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A DESCRIPTIVE ANALYSIS OF THE BAKERY PRODUCTS INDUSTRY DETAILING INDUSTRY TRENDS AND CHARACTERISTICS RELEVANT TO ECONOMIC IMPACT ANALYSIS OF ENVIRONMENTAL STANDARDS (PART II)

COUNCIL ON ENVIRONMENTAL QUALITY

ERNST & ERNST

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INTRODUCTION

In late September the Council on Environmental Quality engaged Ernst & Ernst to study the consequences of pollution abatement requirements for the bakery industry. Ernst & Ernst's task was to use the Environmental Protection Agency's estimates of pollution costs and our investigation of the bakery industry to determine these consequences. This part of the report presents a second descriptive analysis of the industry detailing industry characteristics and trends that are relevant to the economic impact analysis and a tentative evaluation of the overall impact of pollution abatement costs on the industry.

(Part I). An executive summary that presents pertinent industry structure and trends and the quantitative and qualitative findings concerning the economic impacts on the industry of abatement control expenditures.

(Part II). A description of the structure of the industry, an analysis of the industry detailing industry characteristics and trends that are relevant to the economic analysis of the effects of pollution abatement costs on the industry.

(Part III). A detailed analysis of the economic impact of pollution abatement upon the industry, particularly the costs of pollution control. Since the Council on Environmental Quality requested that Part II not include any speculation about the economic impact of pollution costs, the preliminary findings of Part II are included in Part III.

This report represents Part II of the study.

CHARACTERISTICS OF THE BAKERY INDUSTRY

This section details the characteristics of the bakery industry as required in the contract. The discussion will consider the characteristics of demand and supply including the financial structure of the industry.

DEMAND

The industry can be divided into two major sections; bread and related products (SIC 2051) and biscuit and cracker manufacturers (SIC 2052). The former is by far the largest segment with 80 percent of the dollar volume and 90 percent of the poundage produced.

Products and Substitute Products

The output of the industry is divided among the following products:[1/]

SIC 2051	Bread, cake, and related products
20512	Bread and bread-type rolls
20513	Sweet yeast goods
20514	Pies
20515	Pastries
20517	Doughnuts
20510	Bread, cake, and related products, not otherwise classified
SIC 2052	Biscuits and crackers
20521	Crackers and pretzels
20522	Cookies and ice cream cones
20520	Crackers and cookies

The only close substitutes for these products are home-prepared baked goods, since the industry supplies the frozen bakery products for the frozen food industry.

Market Structure

The market for bakery products is almost totally a function of population, and thus the size, location, and importance of the market in any area is a function of the population in that area. There are some regional preferences for particular bakery products but these are relatively insignificant. International trade in bakery products is very small and consumes an insignificant portion of the industry's output.

1/ The industry is often divided as perishable bakery products (SIC 2051) and "dry" bakery products (SIC 2052). The products, however, remain the same.

Thus the impact of cost increases to the industry (e.g., pollution control costs) will be spread to the industry's consumers equally across all regions provided the cost increases are uniform across all regions.

Distribution System

The distribution system for bakery products varies with the type of establishment. In addition the distribution system for dry bakery products differs significantly from that for the perishable bakery goods.

Perishable Bakery Products. The system for distributing these products varies among the five subindustries that handle them. These subindustries are:

Wholesale Bakeries: These bakeries sell at wholesale to such other business concerns as grocers, restaurants, hotels, institutions, and the like that buy the products for resale. Distribution methods for this subindustry include:

(1) Dock sales--products are purchased at the plant by the buyer

(2) Negotiated contracts-large contracts (e.g., to supply a military post) are negotiated between buyer and seller and delivered by bakery truckers

(3) Driver-salesmen--The products are distributed to resale outlets by driver-salesmen on a commission basis

Grocery Chain Bakeries: These are bakeries owned and operated by grocery chain-store companies who distribute the products through their own retail stores. Distribution is carried out by truck.

Home-Service Bakeries: The form of distribution for this industry is through the driver-salesmen on a commission basis.

Retail Multioutlet Bakeries: These are retail bakeries that sell chiefly through nonbaking outlets operated by the same company (e.g., restaurant pantry houses). These products are generally distributed by truck.

Retail Bakeries: High-quality baked goods are sold "over the counter" by bake shops dealing primarily in cookies, cakes, pies, pastries, and specialty breads. Since the goods are usually sold on the same premises where baked there is no distribution system. It should be noted that this subindustry contributes a very small proportion of industry output.

Dry Bakery Products: This industry includes the biscuit and cracker manufacturers. Product distribution is generally by commissioned driver-salesmen and through food wholesalers who then sell to grocery stores and supermarkets.

Market Trends

Bakery industry sales have experienced an annual growth rate of 2.9 percent for the past 10 years; however, much of this growth has been due to price increases. For example, the 1970 value of shipments of bread and related products

increased by 3 percent, whereas prices increased by 4 percent. The same effect was even more pronounced in the biscuit and cracker industry where value of sales rose 4 percent in 1970 while the wholesale price index increased 8 percent. Figures 1 and 2 display some trends for segments of the industry. These figures show the slow growth in output which characterizes this industry and demonstrate the extent to which growth has been due to price increases.

An analysis of the trends indicates that the relative shares of total revenue contributed by the various products have not changed significantly. Table 1 shows the relative contribution of the various products to total revenue in selected years. There has been little change in product contributions in past years and there is no expectation for significant changes in the foreseeable future.

Government Influence

Government influence in the bakery industry is not widespread. While the industry is subject to health regulations, etc., there is little overall influence by government on the demand for bakery products. However, specific bakeries near large government installations (e.g., military bases) may sell a large proportion of their output to such an installation.

Economic Analysis of Demand

The demand for bakery products appears to have been highly inelastic, with the demand for bread being even more inelastic than that for other bakery products. A high degree of competition between bakeries--not only within but also between subindustries--has produced relatively low profit margins in the industry as a whole.

SUPPLY

The size, type, and product of the member firms influence the supply characteristics of segments of the industry. This section details these characteristics and indicates which characteristics might affect the industry's response to pollution abatement costs.

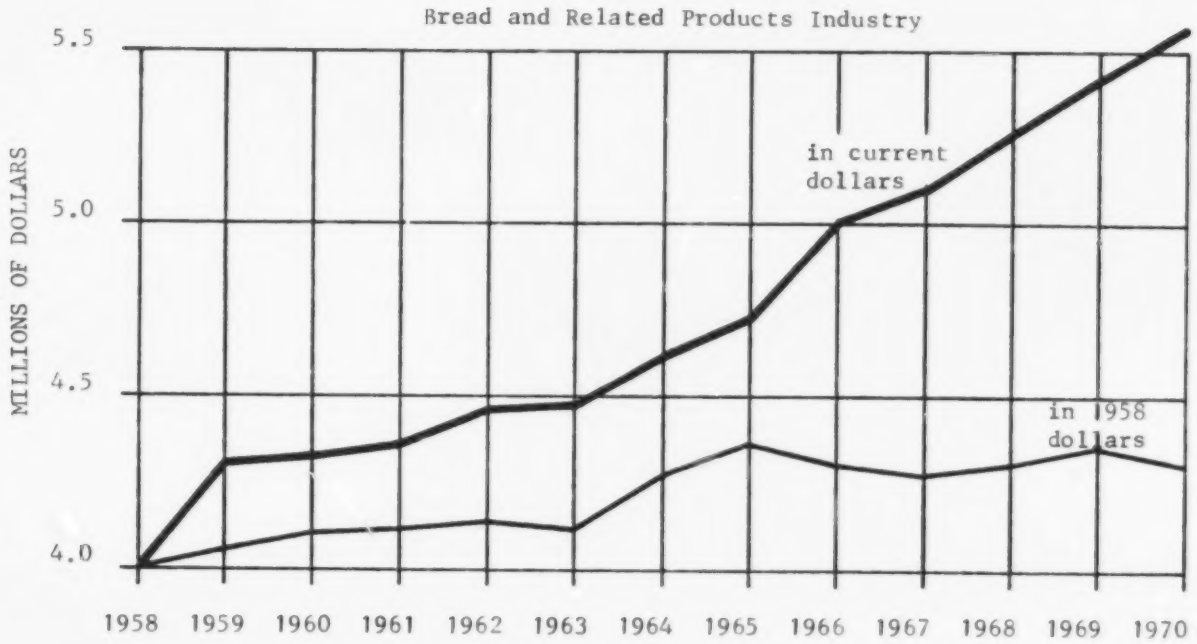
Production Process

The production process for any baked product involves a number of sequential steps, as follows

Mixing. Mixing the ingredients is a necessary first step, and is usually accomplished with either a conventional mixer which operates on the ingredients in batches or by continuous mixers, a relatively new development now being adopted gradually.

Shaping. The shaping of bakery products includes dividing and proofing for bread; rolling and cutting for biscuits, crackers, doughnuts, etc., and panning for pies, cakes, and pastries. The process is usually automated in all but the smallest bakeries and for the most delicate products.

FIGURE 1--VALUE OF SHIPMENTS



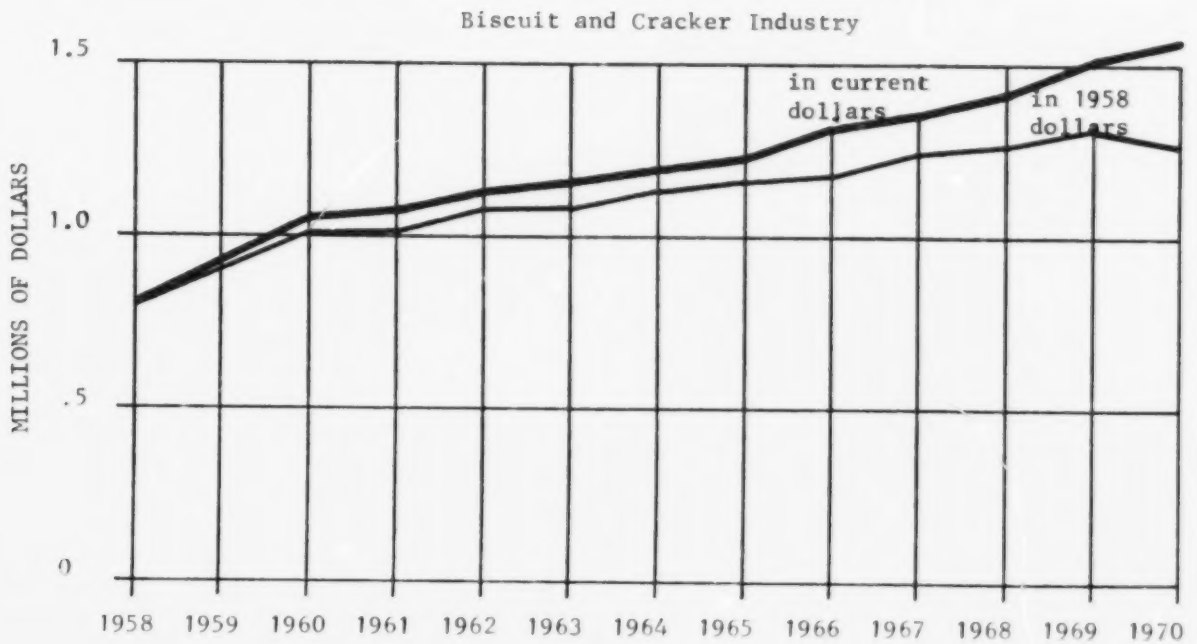


FIGURE 2--WHOLESALE PRICE INDICES FOR THE BAKERY INDUSTRY

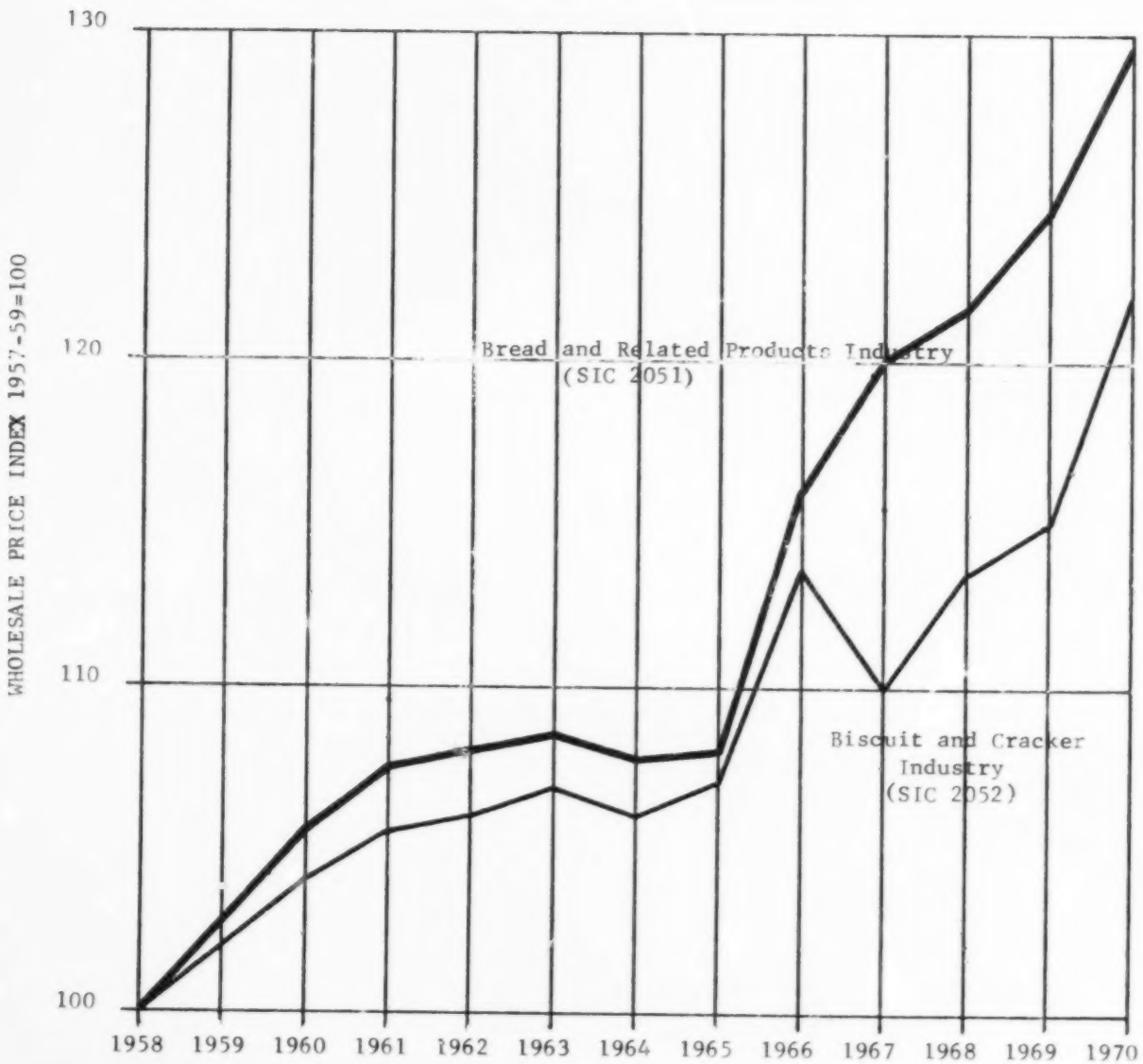


TABLE 1

RELATIVE REVENUE CONTRIBUTIONS OF
SPECIFIC PRODUCTS FOR SELECTED YEARS
(percent of total sales)

Code	Product	1967	1965	1963	1958
2051	Bread and related products	100.0	100	100	100
20511	Bread and rolls	64.5	64.4	65.2	62.4
20512	Sweet yeast goods	9.1	9.2	8.6	8.3
20513	Soft cakes	11.0	11.7	11.4	11.6
20514	Pies	5.7	5.7	5.4	5.7
20515	Pastries	1.2	1.8	1.3	1.1
20517	Doughnuts	3.8	3.9	3.7	3.5
20510	Bread and related products not otherwise classified	4.9	3.1	4.3	7.3
2052	Cookies and crackers	100	100	100	100
20521	Crackers and pretzels	36.6	38.0	39.6	35.6
20522	Cookies and ice cream cones	61.7	61.3	59.8	63.0
20520	Crackers and cookies not otherwise classified	1.7	.6	.6	1.4

Baking. All bakery products with the exception of doughnuts are baked in ovens of either the traveling or batch type. The tendency in the industry since the 1920s has been toward more automated ovens, and batch-type ovens are restricted to very small operations. Doughnuts are made with deep-fat fryers that are preponderantly automated.

Packaging. All bakery products except for those sold over the counter by bake shops are packaged. For bread this involves slicing, wrapping, and cooling, all processes being highly automated. The packaging processes for dry bakery goods are also characterized by a high degree of automation; however, the more delicate products require more hand operations.

Raw Materials

The raw materials for bakeries products are agricultural products except for some flavorings and the wrapping materials. The same materials, though in varying quantities, are used throughout the industry. The major difference lies in the type of flour used. Soft wheat flour is used in cakes, cookies, and other sweet yeast products, and hard wheat flour goes into bread, crackers, pretzels, and the like. Table 2 shows the relative share of materials cost of specific baking ingredients in the two industries.

While the production of some of these materials is local to certain areas of the country (e.g., wheat in the Midwest), the constraints upon the shipments of any bakery products imposed by the requirement that they be fresh are not materially influenced by the point of origin of the raw ingredients.

Location and Number of Bakeries

Despite a growing trend toward concentration in the bakery industry, there are still a very large number of individual firms in the industry. These firms tend to be distributed according to the population of the geographical areas of the country. Table 3 details the regional distribution of bakery firms by subindustry.

The fact that bakeries are distributed according to population minimizes the differential regional impact of pollution control costs.

Types of Firms

Within the bakery industry there are firms of varying sizes, firms with a modicum of integration, a number of multiplant firms, firms with somewhat diversified products, and firms that reach different markets.

The subindustry to which a firm belongs often determines its type. Thus it is useful to discuss firm types in the context of the various subindustries.

Wholesale Bakeries. This subindustry is characterized by a multiplicity of firm sizes. Within a region there may be one or more plants belonging to a large firm as well as large or small single-plant firms. There is little vertical integration; wholesale bakeries rarely engage in retail sales except as they participate in the home-service subindustry. These firms do not

TABLE 2

DELIVERED COST OF INGREDIENTS
(percent of total)

Materials	1967	1963	1958
Bread and Related Products			
Wheat flour	32.4	34.6	33.7
Prepared flour mixes	3.9	3.3	na*
Sugar	7.0	7.7	7.5
Shortening	3.2	2.7	3.3
Lard	1.5	1.9	2.6
Margerine and puff paste	0.5	0.4	2.2
Other fats and oils	1.3	1.8	
Dried milk	2.1	2.0	2.4
Frozen and liquid eggs	2.2	2.7	3.1
Containers and wrapping materials	13.8	15.2	14.3
All other materials, ingredients, and supplies	21.3	19.3	19.9
Materials, ingredients, etc., nsk**	10.8	8.4	11.0
Total	100	100	100
Biscuit and Cracker Products			
Wheat flour	24.2	24.3	24.0
Prepared flour mixes	0.5	0.2	na*
Sugar	11.5	12.6	11.2
Shortening	6.3	4.7	5.7
Lard	3.1	3.9	4.1
Margerine and puff paste	0.1	0.1	4.8
Other fats and oils	1.7	3.4	
Dried milk	0.6	0.5	0.6
Frozen and liquid eggs	0.7	0.8	0.9
Containers and wrapping materials	24.8	26.7	26.1
All other materials, ingredients, and supplies	24.8	21.2	22.6
Materials, ingredients, etc., nsk**	1.7	1.6	
Total	100	100	100

*Not available.
**Cost of material not reported by small establishments.

TABLE 3

CONCENTRATION IN THE BAKERY INDUSTRY

Region	Number of establishments		Value of shipments (millions of dollars)	
	1967	1963	1967	1963
		Total Baking Industry		
New England	410	460	$ 394.8	$ 311.7
Middle Atlantic	1064	1366	1141.5	1144.3
East North Central	746	980	1020.1	888.7
West North Central	344	415	383.4	332.2
South Atlantic	414	483	736.2	586.4
East South Central	161	193	262.8	220.3
West South Central	314	370	386.0	322.9
West	589	743	777.7	699.5
		Wholesale Bakeries Subindustry		
New England	382	388	329.9	207.5
Middle Atlantic	986	1130	943.8	826.5
East North Central	685	827	862.4	652.5
West North Central	313	351	338.7	276.2
South Atlantic	380	424	626.0	487.8
East South Central	157	181	(D)	205.6
West South Central	295	331	(D)	293.2
Mountain	174	202	119.8	101.5
Pacific	379	453	569.5	457.4
		Grocery Chain Bakeries Subindustry		
New England	16	17	55.1	60.6
Middle Atlantic	19	25	93.9	114.6
East North Central	22	31	109.2	108.5
West North Central	25	27	41.7	34.6
South	31	33	116.6	98.3
Mountain	8	11	13.8	14.4
Pacific	7	9	38.1	34.5
		Home-Service Bakeries Subindustry		
New England	4	38	(D)*	40.6
Middle Atlantic	18	142	(D)	129.1
North Central	-	42	-	76.0
South	8	36	(D)	35.1
West	4	23	(D)	52.5

(cont'd)

TABLE 3 (cont'd)

Region	Number of establishments		Value of shipments (millions of dollars)	
	1967	1963	1967	1963
	Retail Multioutlet Bakeries Subindustry			
New England	8	17	(D)	3.0
Middle Atlantic	41	69	(D)	74.0
North Central	44	117	(D)	73.1
South	18	41	(D)	9.5
West	17	45	(D)	39.1
	Biscuit, Cracker, and Cookie Industry			
New England	13	12	14.8	16.8
Middle Atlantic	128	127	379.3	323.6
East North Central	60	64	413.6	353.7
West North Central	24	28	79.4	66.2
South Atlantic	33	31	204.4	156.8
East South Central	15	21	43.7	30.9
West South Central	18	19	58.5	57.3
West	57	54	174.6	144.9

*(D) indicates that data are withheld by the Bureau of the Census to prevent disclosure to competitors.

generally manufacture private-label bread for chain stores since the other grocery stores who make up the bulk of the wholesale bakers market would discriminate against any operator who "runs with the hare and hunts with the hounds." There tends to be less product diversity within this subindustry than in the other subindustries.

Grocery Chain Bakeries. These bakeries, since they are the subsidiaries of grocery chains, are in a sense integrated, to the extent that the manufacturer is the retailer. The size of these "firms" is governed by the size of the grocery chain and within a general hundred-mile radius tend to be a single plant. As grocery chains within a given area vary in size their bakeries vary likewise. These bakeries characteristically also produce a wide range of bakery products in order to complete the chain's product line.

Home-Service Bakeries. These bakeries are fully integrated from manufacturing through retail sales. Typically there is only one plant within a radius of 100 miles for each firm, with the plant size commensurate with the size of the home-service market for bakery products. Since a large proportion of the dollar volume of sales of these firms is due to nonbread products, these bakeries tend to be diversified and some offer a large number of different products. Some home-service bakeries offer in conjunction a line of dairy products.

Retail Multioutlet Bakeries. These firms are typically captives of restaurant chains and specialty food stores. These firms may thus be described as integrated since their activities extend from manufacturing to retail sales. Their financial share of the market arises primarily from the premium prices charged for their products. The firm size tends to be relatively small reflecting their small share of the market, and they tend to produce a highly diversified line of products.

Retail Bakeries. This subindustry is characterized by a multiplicity of very small firms who produce a highly diversified line of products. The industry is integrated in the sense that the manufacturer is the seller.

Biscuit and Cracker Manufacturers. A much higher degree of concentration prevails in this segment of the industry than among bread and related products manufacturers. Consequently firm size tends to be larger, in the sense of occupying a larger share of the market. However, there tends to be less vertical integration in that members of this industry segment rarely sell at retail. The variety of products is very broad, and there is a tendency to specialization in a single product, such as sweet yeast goods or pretzels.

TYPES OF PLANTS

There is a great variety of plant types as well as size and specialty in this industry. A single firm may include plants large and small, new and old, using new or unchanged technology and of widely varying degrees of efficiency.

Diversity, in effect, might be said to be this industry's most dependable characteristic.

Of particular interest for purposes of this study is the fact that low-technology plants do not operate at a very great disadvantage. The larger the plant the higher is the technology used in production; however, the difficulty of changing products (e.g., white to whole-wheat bread) increases with the size of the operations, hence costs tend to equalize. In addition, capacity is added in increments, thus the benefits from higher technology tend to be reduced by using less than full capacity.

EMPLOYEES

Approximately 218,000 persons are employed in the bread and related products industry and 46,000 persons in the biscuit and cracker industry. About 60 percent of those employed in the bread and related products industry are production workers, as are about 80 percent in the biscuit and cracker industry. The character of the two industry segments has its effect here since delivery operations are less extensive in the biscuit and cracker industry.

Skill levels. Bakery industry personnel may be divided into three broad categories: production, distribution, and service which includes maintenance and administrative workers. Production workers in the main are not required to have special skills, since the modern bakery is highly automated and specialized to the point where few skilled workers are needed. The highly skilled baker is now a bakery engineer who serves as a supervisor of semiskilled and unskilled workers. However, skilled bakers are still required in the small hand shops which make high-cost pastries and the like.

Distribution employees in the bakery industry include truck drivers, retail store clerks, shipping room employees, driver-salesmen, and supervisory personnel. None of these employees is highly trained, and much training as exists is primarily "on-the-job" training. The skill levels of these employees, except for the "skill" or salesmanship for the driver-salesmen, are low.

Service employees fall into two types: (1) maintenance personnel who are either unskilled workers or highly skilled mechanics who keep the equipment in operation and (2) administrative workers who are office personnel ranging from file clerks to corporate officers.

RECENT TRENDS

The bakery industry is continually changing as new products are developed, technology changes, and other influences have their impact. This section details the trends in the industry.

Production Process. Continuous dough-mixing equipment is coming into increasing use, and there is movement toward the freezing of dough and baked goods in order to even out production schedules which have been subject to significant within-week fluctuations. Also, there is a significant trend toward more automation in all phases of bakery operations.

Raw Materials. There has been little change in the type or origin of raw materials used with the exception of some new developments in flour milling. It is now possible to produce cake flour from hard wheat and bakeries are making increasing use of this new product.

Location and Number of Bakeries. There has also been little change in the pattern of firm location except that firms are attempting to serve larger areas by improving shipping practices and offering frozen bakery products.

There is a trend toward concentration in the bakery industry, with the average size of firms increasing slowly as the remaining firms take over the markets of firms that go out of business. This trend is expected to continue.

Types of Firms. There is a strong trend in the bakery industry toward the disappearance of home-service bakeries and a milder trend toward the shrinkage of the retail multioutlet bakeries' share of the market. Figure 3 shows a comparison of the market shares for the four major subindustries in selected years.

Other Trends. As noted above, there is a definite trend toward automation in the bakery industry. This causes a very low or negative rate of growth in employment and influences employment in the diversion of less-skilled workers. In fact, except in the biscuit and cracker industry employment has been steadily declining.

FINANCIAL STRUCTURE

As noted in the discussion of demand, the price of bakery products has been increasing rapidly (Figure 2). This trend is expected to continue in the future as costs increase. Physical output, on the other hand, has not increased markedly except in the biscuit and cracker industry. This trend also can be expected to continue into the future since population growth has slowed.

Costs

Since the bakery industry experiences an inelastic demand for its output and a high degree of competition, costs govern the selling price. Hence cost trends are very important. In the present inflationary period all costs, particularly labor costs, are increasing rapidly. For this reason the costs to bakeries of these factors of production can be expected to increase. Table 4 shows the cost behavior in the industry for several years.

Profit margins of bakeries have been traditionally low due to the highly competitive nature of the industry. Return on sales rarely exceeds 3.5 percent and has been declining for the past several years. Return on investment has been falling for the past several years as rising factor costs and the need to modernize plants (thus encouraging capitalization) has squeezed profit margins.

This situation has remained constant over the past several years and is expected to prevail in the future.

It should be noted that because of the nonperishable nature of the biscuit and cracker industry's products their manufacturers are not affected by

FIGURE 3--MARKET SHARES OF BAKING SUBINDUSTRIES

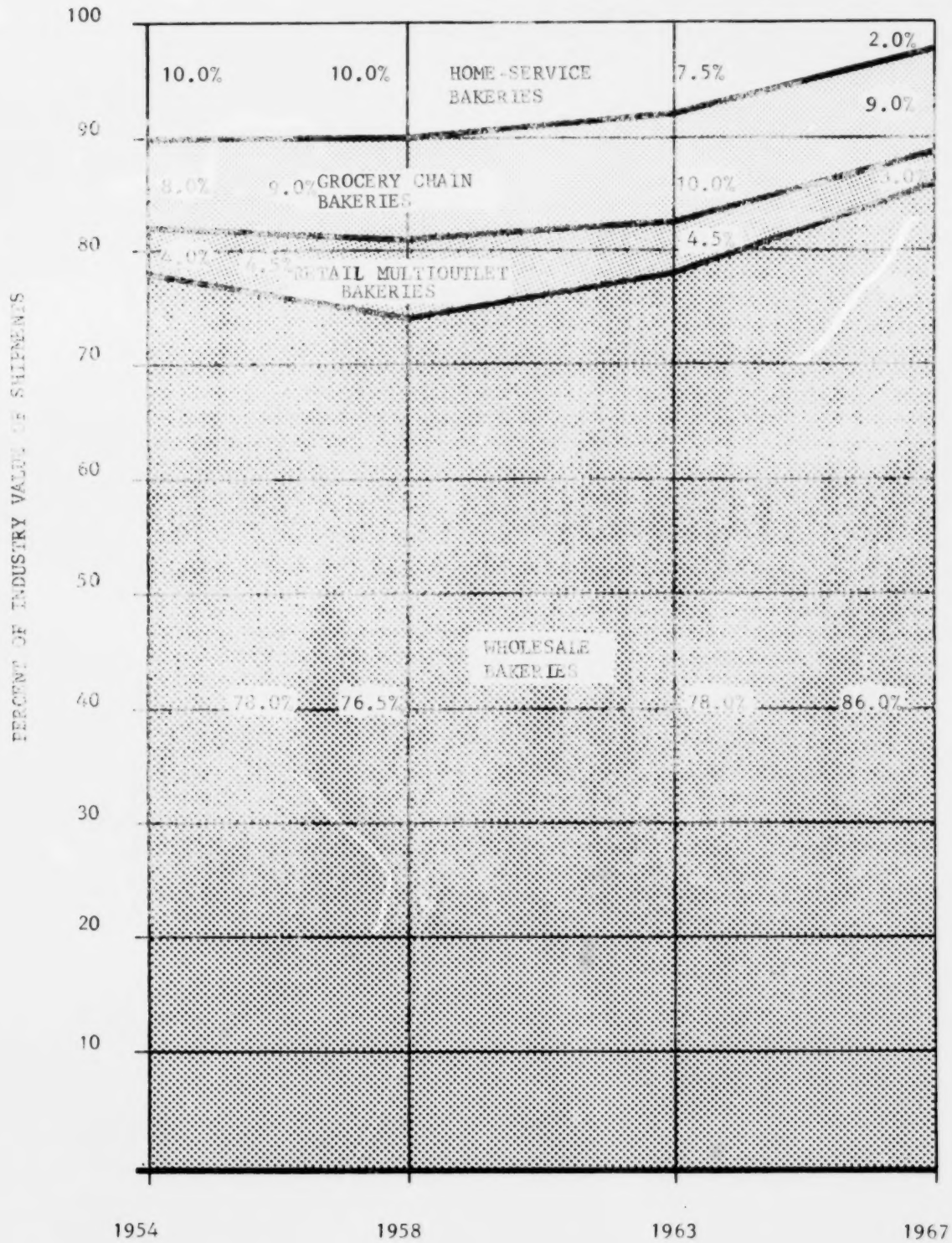


TABLE 4

COSTS OF FACTORS OF PRODUCTION
(in millions of dollars)

Factors	1967	1963
	Bread Industry	
Total payroll	$ 1414.0	$ 1300.3
Production wages	710.8	645.7
Cost of materials	2349.5	2103.1
Capital expenditures	127.9	95.3
	Biscuit, Cracker, and Cookie Industry	
Total payroll	250.8	213.0
Production wages	180.7	150.9
Cost of materials	623.7	523.3
Capital expenditures	24.0	26.4

the weekly demand cycle. However, the single-shift operation does exist in this industry, thus providing the potential for taking up any slack in production.

Competition

Bakers compete within local markets regardless of size and finances. Several large sellers usually account for most of the sales within each local market. However, the definition of "local market" has changed with improvements in shipping practices.

Bread and cake prices tend to be set by the name-brand bakers in a market. Since plants of the same size tend to have identical cost curves, the response of firms with equal plant size to price increases is the same. Smaller firms, since they do not advertise, can meet the prices of the larger firms without losses, thus bakery products tend to have the same prices regardless of the producing firm. The products of some smaller operators who sell to small grocery stores are higher than those of the larger producers but this can be attributable to the convenience character of the retailers.

One exception to this pattern is the case of the grocery-chain bakeries who, because of distributional efficiencies, can charge a lower price for their products.

A salient fact that is extremely important to the response of the industry to effluent charges or pollution control costs is that cost increases in the bakery industry can be passed forward to the retailer who then increases the price of the product to the consumer. This is possible because of the inelastic demand for bakery products.

Another important fact is that small cost increases may be absorbed by the producers until they total enough to add a penny a loaf to bread products and a penny a unit to other products. Thus there is the possibility of a lag in the industry's price response to increased costs due to pollution control activities.

Government Supply Influence

Government influence on the supply of bakery products is minimal. Even government-sponsored price support for bakery ingredients (flour, sugar, etc.) does not have a noticeable effect--because of the inelastic demand--other than to cause a higher-than-otherwise selling price. This is unlikely to change in the near future.

Industry Capacity and Capacity Utilization

While bakeries have not experienced rapid growth in demand and hence have not over-installed capacity ahead of time, many bakeries operate on a single-shift basis although the machinery could be operated 24 hours a day. Thus the industry has ample overcapacity to take up the slack should some plants leave the industry. In addition, due to the within-week fluctuations of demand many bakeries operate at 60 percent capacity some days of the week. Bakeries could increase the freezing of their products thus effectively increasing capacity by operating at 100 percent of shift capacity every day.

OBJECTIVES OF THE SECOND PRODUCT

The objective of the second half of the study will be to prepare the second product called for in the study. This second product will expand the impact analysis to include:

- Locational dislocations
- Mitigating effects
  - Reemployment of workers in the same or other industries
  - State subsidies of pollution control costs
- Net regional employment impacts
- A more detailed investigation of pollution abatement costs on industry cost curves
- Additional topics suggested by the contractee in light of the findings of the first product